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Tree planting on the Prairie states
forestry project.

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TREE PLANTING

ON THE PRAIRIE STATES FORESTRY PROJECT

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INTRODUCTION

EACH STEP in the struggle of American civilization westward from the Atlantic seaboard was won by prodigious labor in clearing land for agriculture. Trees were considered of no value. They were something to be removed.

Beyond the edge of the forested areas was a vast expanse of waving grass—the prairie with soils deep and fertile. Although the sod may have been hard to plow, the settlers found this easier than had been the clearing of the land of standing timber in the regions first settled.

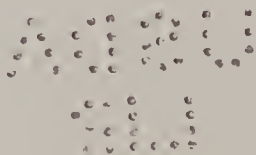
The treeless condition of the prairies and the Plains, however, was not entirely helpful to agriculture and home building. Little or no wood was available for fuel, fencing, or building construction. The blizzards of winter and the searing winds of midsummer swept unchecked across the land, bringing distress to man and livestock and often causing loss of crops. Time added another serious hazard to agriculture. As the acreages broken by the plow increased and constant tillage continued, the wind blew away much priceless topsoil and organic matter. The capacity of the soil to soak up moisture was thereby lessened and the run-off after rains increased. Bumper crops became less common, failures more frequent.

Farmers in the Prairie-Plains region have from early times realized the value of trees. Many have made efforts to establish plantings, usually about individual homesteads. The success of some of the early efforts is indicated by the existence of old groves, but lack of knowledge of how to establish and protect the plantings often resulted in wasted effort. The settlers soon learned that farming methods which would produce a crop in the East would not suffice on Prairie-Plains farms, but they did not always recognize that the same principles would also apply to tree culture.

The requirements for success in growing trees in the Prairie-Plains region are now better known, and the practicability of planting in the lighter soils has been amply demonstrated in the many miles of successful shelterbelts established by the Prairie States Forestry Project of the United States Forest Service. The practices and methods outlined in this leaflet are in use on this project.

PREPARED BY THE
PRAIRIE STATES FORESTRY PROJECT
FOREST SERVICE

[Issued October, 1938]



Why Plant Trees?

DURING recent drought years the Prairie-Plains region has suffered crop failures and much serious wind erosion. Moisture in the form of rain and snow comes in cycles of alternating wet and dry periods. In this region, where moisture is such a limiting factor in agricultural production, tree plantings to protect crops and cropland are urgently needed.

Field shelterbelts furnish protection behind which good soil and cropping practices are most effective. Without such protection, these practices are frequently inadequate to hold the soil and assure a crop in the critical periods when the moisture supply is short. However, it does not follow that such plantings will always insure a crop in the years of most severe drought.

Each prairie farm should also have a windbreak to protect the farm home and, in many cases, the feed lot. Most farms would benefit from a small planted woodland. Less fuel is required in winter to heat a house that is protected than one that is unprotected. If protected, livestock requires less feed in winter, and less feed blows away.

Properly distributed in shelterbelts and other plantings, 8 to 10 acres of trees are adequate for protection on the average 160 acres of farm land. The trees will furnish fuel and posts. They may furnish cover for game birds and birds that eat crop-destroying insects. They are valuable for recreation. Trees are among the least expensive of the improvements which a prairie farmer can put upon his land.

Some Basic Principles

THE PRINCIPLES which must be observed if tree planting in the Prairie-Plains region is to be successful have been worked out through investigations and analyses of past plantings. They are comparatively simple and may be easily followed by any farmer. The success that has attended the

Narrow shelterbelts spaced at about 20-rod intervals on a farm in Nebraska. Good crops are being grown in the protected areas.

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Crew illustrating planting method; left to right, man scraping away litter, inserting shovel, throwing back the handle to break open the ground, pulling back to remove soil, placing the tree, and tamping the fill with foot.

application of these principles shows that there is nothing mysterious or complex about tree-planting procedure.

Most people prefer one species of trees to another because of some outward characteristic and have little understanding of the tree's intrinsic qualities and adaptability to given soil or climatic conditions.

The purpose of a planting often affects the choice of a species. A species that grows slowly and does not reach large size may prove excellent for shelterbelt planting but ill-adapted for a farm-woodland tree to produce woods products such as fence posts and fuel.

Soil type must also be considered. Some soils are hard; others are light; some are shallow; and some are deep. The moisture, too, may be near the surface or at some depth. Some trees are very sensitive to these factors, but a few species show adaptability to rather a wide range of conditions.

In the Prairie-Plains region it is particularly important that the species selected be hardy, drought-resistant, and climatically adapted. Even though a species having the first two characteristics be chosen the trees may not prove satisfactory unless they are produced from seed having the proper source.

In this region it is important that the nursery stock to be used be grown from seed collected locally. Over a period of many generations trees, like other organisms, develop characteristics which fit them for the particular environment in which they grow and may unfit them for another type of environment. The rough-leaved hackberry, for example, grows in the region extending from the cold and dry Turtle Mountains of North Dakota



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Trees in the Prairie-Plains region need good care such as has been given this shelterbelt on the Lund farm in Nebraska. The pines in the foreground, now 5 years old, were wild seedlings when planted. The Chinese elms in the background are 7 years old.

to the warm and humid sections of southern Texas. The southern strains will not be hardy in the North, however, nor will the northern strains grow well in the South. In particular, stock from seed produced in the humid East should not be planted in the drier Prairie-Plains region.

Exhaustive trials have demonstrated that it does not pay to plant weak or undersized planting stock in this region. Thrifty seedlings may cost a few dollars more per thousand, but they are a good investment. Poor stock is more likely to fail and result in the expenditures being a total loss.

A plantation of mixed species of trees generally has a better chance for survival and growth than a stand of a single species, and there is less danger that a disease or insect infestation peculiar to a certain species will wipe out the entire plantation. Consideration must be given, however, to the growth characteristics of the various species and to the purpose of the plantation in arranging the composition of the stand. A shelterbelt is more effective if the taller growing trees are planted in the middle of the belt, with trees of the lower-growing species and shrubs on the outside, so that the shelterbelt presents a sloping surface to the prevailing wind from which protection is desired.

Procedure in Planting

BEFORE the trees are planted the problem of first importance is the selection of the location. Trees once established are a permanent fixture. The decisions made at this time must hold for the life of the trees. Mistakes may prove most unfortunate. A windbreak about the farm home, for example, may be so located as to prevent snow from drifting about the

buildings; but, if carelessly located, it may cause worse drifting than if there were no windbreak. Trees planted too close to a road may some day have to be removed if it is decided to widen the thoroughfare. A field shelterbelt has its maximum effectiveness if oriented at right angles to the direction of the most damaging winds; and, unless it is so located, it may fail of its purpose.

Spacing of the trees is important. Since the supply of moisture is the principal limiting factor in tree growth in the Prairie-Plains region the usual conclusion is that with fewer per unit of area a greater amount of moisture will be available to each tree. Actually, however, loss of moisture through transpiration from the leaves does not increase in proportion to the number of trees per unit of area. Closely planted trees also tend to retard evaporation directly from the soil and will shade out other forms of vegetation that use moisture, such as grass and weeds.

In the shelterbelt plantings established by the Prairie States Forestry Project trees are spaced 8 by 6 feet and shrubs 8 by 3 feet apart in the North. The spacing in the southern part of the area is 10 by 8 feet for trees and 10 by 4 feet for shrubs. Many of these plantations will have to be thinned somewhat as time passes and the trees develop size, but in the meantime they will provide a dense canopy over the ground and build up a mulch of leaves and litter. The thinnings will yield fence posts, fuel, and wood for other uses.

Trees planted in sod or interspersed in growing crops have slight chance for success. It is better, if possible, to clean-fallow the land 1 year in advance of planting. This is especially desirable if the soil is fairly heavy. The strips occupied by the rows of trees, at least, should be thoroughly loosened to a depth of 12 or 14 inches. The trees should not be planted in a furrow.

Trees may be planted at any time in the spring when the ground may be worked and before they begin to leaf out. Fall and winter planting in the South is practicable and often gives better results.

Roots of the planting stock should be kept covered to prevent them from drying out before being placed in the ground. This is extremely important. An exposure of even a few minutes, especially on a bright windy day, may be enough to injure the trees and cause them to die after they are planted.

If it is necessary to heel-in the nursery trees for a time before planting, they should be placed in trenches in a moist location. The moist soil should adequately cover the roots and part of the stems and be sifted in about the roots and firmly tamped.

Seedling trees should be planted in the field about 1 inch deeper than they grew when in the nursery, each tree in a hole deep enough to prevent the roots from being curled. The soil should be packed firmly about the roots to avoid the possibility of air pockets. The trees should be planted



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Field shelterbelt in Nebraska, 20 years old, principally mulberry and catalpa, protecting a wheatfield.

immediately upon opening the hole. Dry surface soil should not be allowed to come in contact with the roots.

Care of Plantations

No FARMER would plant a corn crop and fail to cultivate it or turn his livestock into the field. Private tree plantations have in many cases been so treated. Trees in the Prairie-Plains region need the best care that can be given, especially careful early cultivation. Weeds and grass have exactly the same effect on trees that they have upon a crop; the weaker trees succumb to the competition, and the rest are stunted. Cultivation is necessary, however, only when the trees are young. The crowns will develop in 2 to 4 years and touch each other where the trees are closely spaced, shading the ground and making further cultivation unnecessary.

Livestock do much damage to both young and old plantations. They browse and break young trees and pack the soil by trampling. In older plantings they open up the stand by trampling and browsing so that the valuable leaf litter is destroyed or blown away.

Rodents, particularly rabbits, do great damage to young trees, and must be controlled by poison or trapping where their depredations become serious. Grasshoppers and other defoliating insects often attack young trees, and a variety of borers and some defoliators may sometimes cause damage when the trees are older.

Trees for windbreak purposes should not be pruned but should be allowed to retain as many of the lower limbs as they will. If trees are pruned, the trunks do not adequately break the force of the wind near the ground.

Information About Trees

A GREAT deal of research has been done on tree planting. Literature on the subject is available from the United States Department of Agriculture and various State agricultural colleges. The forward looking farmer who wishes to protect his holding with trees may avail himself of and be guided by the information that has been collected. State agricultural colleges and State forestry departments may also furnish advice and assistance in solving tree-planting problems. Nursery stock is more easily available and of better quality than ever before. Inquiries about the Prairie States Forestry Project may be addressed to the Director, United States Forest Service, 413 Sharp Building, Lincoln, Nebr., or to the Forest Service, United States Department of Agriculture, Washington, D. C.

Shelterbelts for Protection

THE Prairie States Forestry Project of the United States Forest Service has planted field protective shelterbelts in cooperation with individual farmers living in that part of the Prairie-Plains region lying in general along and east of the one-hundredth meridian in North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and northwestern Texas. The first planting was made in 1935. By the spring of 1938, some 85 million trees had been planted. They made up nearly 7,000 miles of shelterbelts and occupied more than 100,000 acres on more than 13,800 farms.

Despite the unprecedented drought of 1935-37 and deficient subsoil moisture, more than 65 percent of the trees planted in the project up to October 1, 1937, had survived and done well. Under the most favorable circumstances the faster-growing species reached heights of 10 feet in 1 year and of 24 feet in 3 years; and the benefits of the earlier-planted shelterbelts were discernible on adjacent farm land.

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